

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

<b>In re Application of:</b>	<b>Steve Kangas</b>
<b>Application No.:</b>	<b>10/658729</b>
<b>Filed:</b>	<b>September 9, 2003</b>
<b>For:</b>	<b>Lubricious Coatings for Medical Device</b>
<b>Examiner:</b>	<b>Vi X. Nguyen</b>
<b>Group Art Unit:</b>	<b>3734</b>

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**Docket No.: S63.2B-10814-US01**

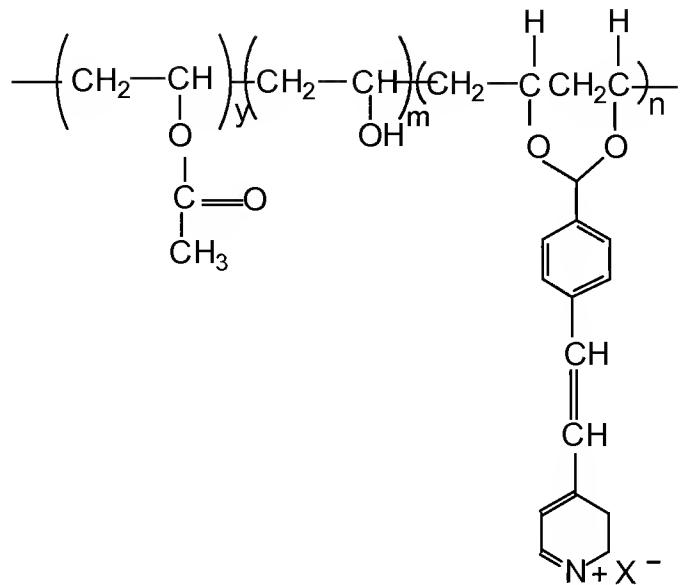
**RESPONSE TO RESTRICTION REQUIREMENT**

This communication is in response to the Office Action dated **October 2, 2007**,

If an extension of time is required to make this response timely and no separate petition is enclosed, Applicants hereby petition for an extension of time sufficient to make the response timely. In the event that this response requires the payment of government fees and payment is not enclosed, please charge Deposit Account No. 22-0350.

**Status of the Claims**

1. (Withdrawn) An ultraviolet curable lubricious coating comprising:
  - a) at least one lubricious polymer; and
  - b) at least one polymer which is crosslinkable by an oxygen-insensitive non-cationic mechanism.
2. (Withdrawn) The lubricious coating of claim 1 wherein said at least one lubricious polymer is hydrophobic, hydrophilic or a mixture thereof.
3. (Withdrawn) The lubricious coating of claim 1 wherein said at least one lubricious polymer is hydrophilic.
4. (Withdrawn) The lubricious coating of claim 1 wherein said at least one lubricious polymer is a noncrosslinked hydrogel.
5. (Withdrawn) The lubricious coating of claim 1 wherein said at least one lubricious polymer is crosslinkable.
6. (Withdrawn) The lubricious coating of claim 5 wherein said lubricious polymer and said at least one oxygen-insensitive crosslinkable polymer form an interpenetrating network.
7. (Withdrawn) The lubricious coating of claim 1 wherein said crosslinkable polymer comprises at least one styrylpyridinium group.
8. (Withdrawn) The lubricious coating of claim 1 wherein said crosslinkable polymer has the following general structure:



where  $m$  and  $n$  are positive numbers and  $\text{X}$  is an anion.

9. (Withdrawn) The lubricious coating of claim 1 wherein said lubricious polymer is a hydrophilic polymer selected from the group consisting of poly(acrylic acid), poly(methacrylic acid), polyurethanes, polyethylene oxide, poly(N-isopolyacrylamide), or polymers of hydroxyl-substituted lower alkyl acrylates, methacrylates, acrylamide, methacrylamide, lower allylacrylamides and methacrylamides, hydroxyl-substituted lower alkyl vinyl ethers, sodium vinylsulfonate, sodium styrenesulfonate, 2-acrylamido-2-methylpropanesulfonic acid,  $\text{N}$ -vinylpyrrole,  $\text{N}$ -vinyl-2-pyrrolidone, 2-vinyloxazoline, 2-vinyl4,4'-dialkyloxazolin-5-one, 2- and 4-inylpruidine, vinylically unsaturated carboxylic acids having a total of 3 to 5 carbon atoms, amino-lower alkyl (where the term 'amino' also includes quaternary ammonium), mono-lower alkylamino-lower alkyl and di-lower alkylamino-lower alkyl acrylates and methacrylates, allyl alcohol, any copolymers thereof, and mixtures thereof.

10. (Withdrawn) The lubricious coating of claim 9 wherein said lubricious polymer is

polyethylene oxide.

11. (Withdrawn) The lubricious coating of claim 9 wherein said lubricious polymer is a polyurethane or a blend of polyurethanes.

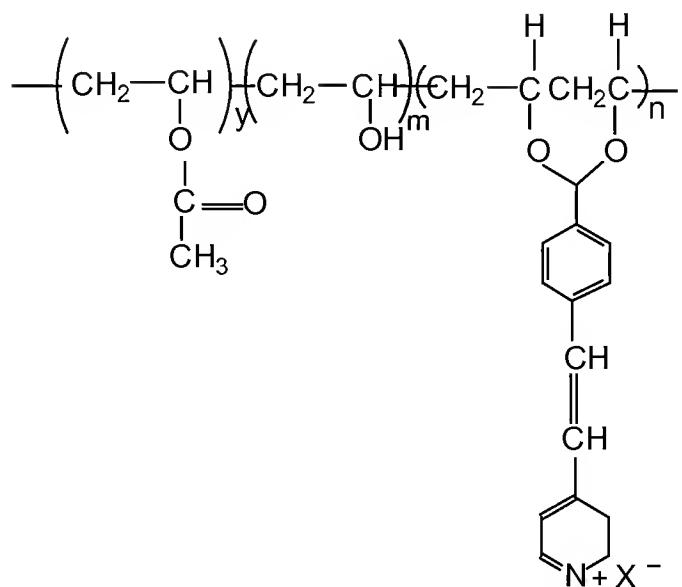
12. (Withdrawn) A medical device comprising:

a) a tubular member;

b) a coating on said tubular member, said coating comprising at least one hydrophilic polymer and at least one polymer which is crosslinkable by an oxygen-insensitive, non-cationic mechanism.

13. (Withdrawn) The medical device of claim 12 wherein said oxygen-insensitive crosslinkable polymer comprises styrylpyridinium groups.

14. (Withdrawn) The medical device of claim 12 wherein said oxygen-insensitive crosslinkable polymer has the following general structure:



where m and n are positive numbers and X is an anion.

15. (Withdrawn) The medical device of claim 12 wherein said at least one hydrophilic polymer comprises at least one member selected from the group consisting of but are not limited to, poly(acrylic acid), poly(methacrylic acid), polyurethanes, polyethylene oxide, poly(N-isopolyacrylamide), or polymers of hydroxyl-substituted lower alkyl acrylates, methacrylates, acrylamide, methacrylamide, lower allylacrylamides and methacrylamides, hydroxyl-substituted lower alkyl vinyl ethers, sodium vinylsulfonate, sodium styrenesulfonate, 2-acrylamido-2-methylpropanesulfonic acid, N-vinylpyrrole, N-vinyl-2-pyrrolidone, 2-vinyloxazoline, 2-vinyl4,4'-dialkyloxazolin-5-one, 2- and 4-inylpruidine, vinylically unsaturated carboxylic acids having a total of 3 to 5 carbon atoms, amino-lower alkyl (where the term 'amino" also includes quaternary ammonium), mono-lower alkylamino-lower alkyl and di-lower alkylamino-lower alkyl acrylates and methacrylates, allyl alcohol and mixtures thereof.

16. (Withdrawn) The medical device of claim 15 wherein said at least one hydrophilic polymer is polyethylene oxide.

17. (Withdrawn) The medical device of claim 15 wherein said at least one hydrophilic polymer is a polyurethane or a blend of polyurethanes.

18. (Withdrawn) The medical device of claim 17 wherein said at least one hydrophilic polymer is an aliphatic polyether polyurethane.

19. (Withdrawn) The medical device of claim 18 wherein said at least one aliphatic polyether polyurethane can absorb from about 500% to about 2000% water by weight.

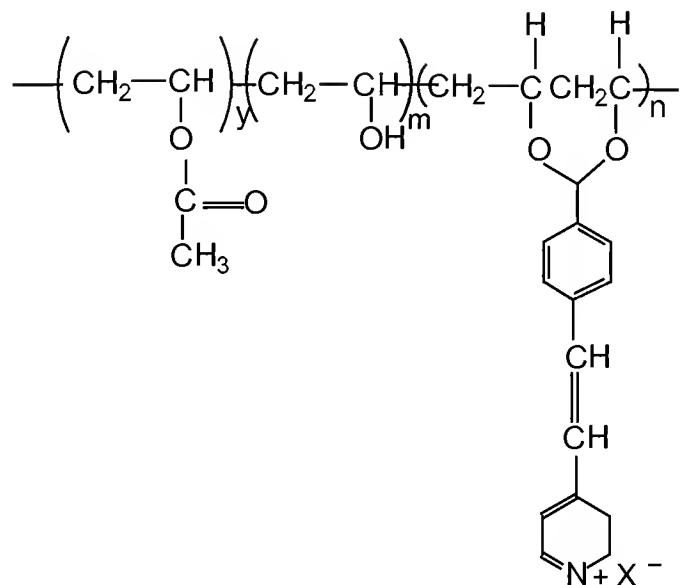
20. (Withdrawn) The medical device of claim 12 wherein said tubular member has an inner surface and an outer surface.

21. (Withdrawn) The medical device of claim 12 wherein said hydrophilic coating is on said

inner surface, said outer surface or a combination thereof.

22. (Withdrawn) A dilatation balloon with a coating, said coating comprising at least one lubricious polymer and at least one polymer which is crosslinkable by an oxygen-insensitive non-cationic mechanism.

23. (Withdrawn) The dilatation balloon of claim 22 wherein said oxygen insensitive crosslinkable polymer has the following general formula:



where m and n are positive numbers and X is an anion.

24. (Withdrawn) The dilatation balloon of claim 22 wherein said lubricious polymer is hydrophobic, hydrophilic or a mixture thereof.

25. (Withdrawn) The dilatation balloon of claim 22 wherein said lubricious polymer is a noncrosslinkable hydrogel.

26. (Withdrawn) The dilatation balloon of claim 22 wherein said at least one hydrophilic

polymer comprises at least one member selected from the group consisting of but are not limited to, poly(acrylic acid), poly(methacrylic acid), polyurethanes, polyethylene oxide, poly(N-isopolyacrylamide), or polymers of hydroxyl-substituted lower alkyl acrylates, methacrylates, acrylamide, methacrylamide, lower allylacrylamides and methacrylamides, hydroxyl-substituted lower alkyl vinyl ethers, sodium vinylsulfonate, sodium styrenesulfonate, 2-acrylamido-2-methylpropanesulfonic acid, N-vinylpyrrole, N-vinyl-2-pyrrolidone, 2-vinyloxazoline, 2-vinyl4,4'-dialkyloxazolin-5-one, 2- and 4-inylpruidine, vinylically unsaturated carboxylic acids having a total of 3 to 5 carbon atoms, amino-lower alkyl (where the term 'amino" also includes quaternary ammonium), mono-lower alkylamino-lower alkyl and di-lower alkylamino-lower alkyl acrylates and methacrylates, allyl alcohol and mixtures thereof.

27. (Withdrawn) The dilatation balloon of claim 26 wherein said at least one hydrophilic polymer is polyethylene oxide.

28. (Withdrawn) The dilatation balloon of claim 26 wherein said at least one hydrophilic polymer is a polyurethane or a blend of polyurethanes.

29. (Withdrawn) The dilatation balloon of claim 28 wherein said at least one hydrophilic polymer is an aliphatic polyether polyurethane.

30. (Withdrawn) The dilatation balloon of claim 29 wherein said aliphatic polyether polyurethane is capable of absorbing from about 500% to about 2000% water by weight.

31. (Withdrawn) The dilatation balloon of claim 22, said balloon having an inner surface and an outer surface.

32. (Withdrawn) The dilatation balloon of claim 31 wherein said hydrophilic coating is on said inner surface, said outer surface or a combination thereof.

33. (Original) A method of coating at least one surface of a medical device, said method

comprises the steps of:

- a) applying a mixture to said at least one surface of said medical device, said mixture comprising at least one lubricious polymer and at least one polymer which is crosslinkable by an oxygen-insensitive non-cationic mechanism; and
- b) exposing said coating to ultraviolet radiation.

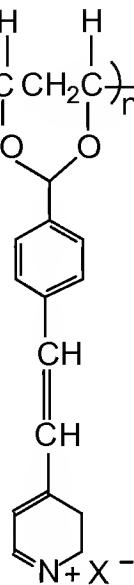
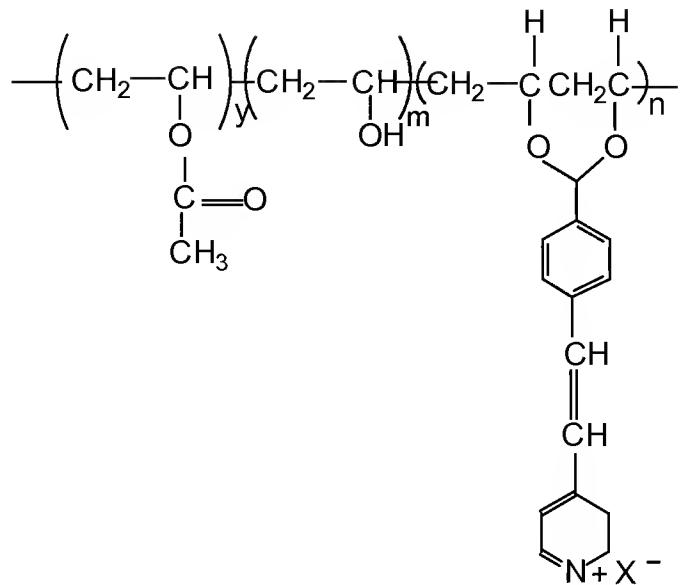
34. (Original) The method of claim 33 wherein said mixture is applied out of solvent.

35. (Original) The method of claim 33 wherein said mixture is applied to said surface of said medical device by spraying, dipping, painting or coextruding.

36. (Original) The method of claim 34 wherein said mixture is present at a concentration of about 1 wt-% to about 5 wt-% solids.

37. (Original) The method of claim 33 wherein said oxygen-insensitive ultraviolet crosslinkable polymer comprises styrylpyridinium groups.

38. (Original) The method of claim 33 wherein said oxygen-insensitive ultraviolet crosslinkable polymer has the following general structure:



wherein m and n are positive numbers and X is an anion.

39. (Original) The method of claim 33 wherein said lubricious polymer comprises at least one member selected from the group consisting of comprises at least one member selected from the group consisting of but are not limited to, poly(acrylic acid), poly(methacrylic acid), polyurethanes, polyethylene oxide, poly(N-isopolyacrylamide), or polymers of hydroxyl-substituted lower alkyl acrylates, methacrylates, acrylamide, methacrylamide, lower allylacrylamides and methacrylamides, hydroxyl-substituted lower alkyl vinyl ethers, sodium vinylsulfonate, sodium styrenesulfonate, 2-acrylamido-2-methylpropanesulfonic acid, N-vinylpyrrole, N-vinyl-2-pyrrolidone, 2-vinyloxazoline, 2-vinyl4,4'-dialkyloxazolin-5-one, 2- and 4-inylpruidine, vinylically unsaturated carboxylic acids having a total of 3 to 5 carbon atoms, amino-lower alkyl (where the term 'amino" also includes quaternary ammonium), mono-lower alkylamino-lower alkyl and di-lower alkylamino-lower alkyl acrylates and methacrylates, allyl alcohol and mixtures thereof.

40. (Original) The method of claim 39 wherein said at least one hydrophilic polymer is polyethylene oxide.

41. (Original) The method of claim 39 wherein said at least one hydrophilic polymer is a polyurethane or a blend of polyurethanes.

42. (Original) The method of claim 41 wherein said at least one hydrophilic polymer is an aliphatic polyether polyurethane.

43. (Original) The method of claim 42 wherein said aliphatic polyether polyurethane is capable of absorbing about 500% to about 2000% water by weight.

**REMARKS**

In response to the Restriction Requirement under 35 U.S.C. §121 between the following inventions:

Group I, claims 1-11, drawn to an ultraviolet curable lubricious coating;

Group II, claims 12-32, drawn to a medical device; and

Group III, claims 33-43, drawn to a method of coating a surface of a medical device;

Applicant elects to prosecute the invention of Group III, claims 33-43. Claims 1-32 are withdrawn.

Applicant reserves the right to prosecute the inventions of Groups I and II in divisional applications.

**CONCLUSION**

Applicant has addressed the Restriction Requirement. Expeditious examination of the elected claims is hereby requested. The attorney of record may be reached at (952)563-3011 to address any issues which may expedite prosecution of this application.

Respectfully submitted,

VIDAS, ARRETT & STEINKRAUS

Date: November 2, 2007

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